

Asarco Ray Operations  
Aquifer Protection Permit No. P-100525  
Place ID 9676, LTF No. 94567  
Significant Amendment

**I. Introduction:**

The Arizona Department of Environmental Quality (ADEQ) proposes to issue an Aquifer Protection Permit (APP) for the subject facility that covers the life of the facility, including operational, closure, and post-closure periods unless suspended or revoked pursuant to Arizona Administrative Code (A.A.C.) R18-9-A213. The requirements contained in this permit will allow the permittee to comply with the two key requirements of the Aquifer Protection Program: 1) meet Aquifer Water Quality Standards (AWQS) at the Point of Compliance (POC); and 2) demonstrate Best Available Demonstrated Control Technology (BADCT). BADCT's purpose is to employ engineering controls, processes, operating methods or other alternatives, including site-specific characteristics (i.e., the local subsurface geology), to reduce discharge of pollutants to the greatest degree achievable before they reach the aquifer or to prevent pollutants from reaching the aquifer.

**II. Permittee, Facility Name, and Location:**

<b>Facility Name:</b>	ASARCO Ray Operations
<b>Facility Address:</b>	27809 N. Mineral Creek Road, Kearny, Arizona 85137
<b>County:</b>	Pinal County
<b>Permittee:</b>	ASARCO LLC
<b>Permittee Address:</b>	ASARCO LLC – Ray Operations Box 640, Kearny, AZ 85137
<b>Facility Contact:</b>	General Manager
<b>Emergency Phone No.:</b>	(520) 356-2400
<b>Latitude/Longitude:</b>	33° 09'18" N / 110° 58' 56" W
<b>Legal Description:</b>	Sections 34 and 35, Township 2 South, Range 13 East; and Sections 1-4, 9-16, 22-26, 35, and 36 Township 3 South, Range 13 East; and Sections 18, 19, 29, 30, 31, and 32 Township 3 South, Range 14 East of the Gila and Salt River Base Line and Meridian.

**III. Facility Description:**

The ASARCO LLC (ASARCO) Ray Operations are located in eastern Pinal County, along State Highway 177, approximately ten miles to the north of Kearny. The site consists of an open-pit mine and associated leach and barren rock deposition areas (RDAs), a mill that produces concentrate, a solvent extraction-electrowinning (SX-EW) plant that produces electrowonned copper cathodes from the leaching operations, and a tailings deposition facility for storage of tailings produced during the flotation process at the Ray Concentrator. Underground mining activities began in the area around 1880, and continued periodically until the mid-1940's. The Ray Mine has been in operation since 1911. In 1948 the Kennecott Copper Company (Kennecott) consolidated the remaining mining operations and began the development of the open-pit mine. ASARCO purchased the mine from Kennecott in 1986. The Ray porphyry copper deposit lies within the historical drainage of Mineral Creek, which bisected the deposit until late 1972. The water within the creek was diverted around the mine via an 18,181 foot long man-made diversion

tunnel, which was driven into the Dripping Springs Mountain Range located to the east of the mine. A 13,300 foot extension of the diversion tunnel was completed in 2002, to better isolate the waters of Mineral Creek from mining, milling, and leaching operations.

The copper sulfide ores mined at the Ray Mine are taken to one of two crushing facilities on-site, and then conveyed to the Ray Concentrator or shipped off-site by rail to the Hayden Concentrator for milling to produce concentrates for smelting. The remaining material consists of leach rock material and barren rock. The leach rock material is taken to prepared RDAs and leached, and barren rock is hauled to separate RDAs where no leaching presently occurs.

The RDAs are typically constructed by end-dumping ore from trucks in 25 to 100 foot lifts. Ultimate RDA heights may exceed 1,000 feet. Leach solution (raffinate) is applied to the RDAs by flooding bermed cells on top of the RDAs; or spraying, trickling, or dripping solution onto the top of the RDAs. Solution can also occasionally be applied to an RDA face. Raffinate percolates through the RDA, reacting with the copper bearing ores, and ultimately flows out the toe of the RDA as pregnant leach solution (PLS). The PLS is captured by a downgradient collection system, typically an impoundment, and piped to the SX-EW Plant for the production of electrowinned copper cathodes.

Operational facilities, such as ditches and catchments, are integral parts of the RDAs and serve to manage process fluids within the RDAs. These facilities are transient in nature and move in conjunction with the lateral or vertical expansion of the RDA, as well as changing patterns of raffinate application. Moreover, during their existence, these facilities typically have variable liquid levels based on evaporation rates, impoundment elevation, rock placement, and raffinate application rates. The facilities may contain stormwater, process contact water, PLS, raffinate, or any combination thereof. ASARCO refers to these facilities as Dynamic Solution Management Facilities (DSMFs). These facilities exist only on permitted RDAs and are considered part of the RDAs for permitting purposes, rather than being separately permitted.

The permitted facilities include 8 RDAs (incorporating the associated DSMFs); 29 primary and secondary process solution impoundments; 7 non-stormwater impoundments; 3 truck-wash facilities; 1 tailing impoundment; 1 non-municipal solid waste landfill; and 22 formerly used detention ponds. The facilities are identified by association with one of three hydrologic sub-areas (Sub Area A through Sub Area C) based on groundwater and surface water flow characteristics.

A full listing of permitted facilities is listed in Table 1: DISCHARGING FACILITIES of Individual APP under Inventory Number 100525 and LTF 94567 (Individual APP). The facility description and BADCT description for each permitted facility is contained in Table 10: PERMITTED FACILITIES AND BADCT of the Individual APP.

#### **IV. Amendment Description:**

The Asarco Ray Mine currently operates the Elder Gulch Tailings Storage Facility (TSF), which can provide tailings storage through 2025 at an annual mill feed rate of up to 9.96 million tons per year to the current permitted maximum dam crest elevation of 2590 feet.

This amendment will allow raising the maximum dam crest of the facility to 2700 ft elevation. Each 10-foot of additional crest elevation provides about 1-year of tailings storage capacity. When permitted this will provide the Ray Concentrator tailings management requirements through 2036. The maximum mill feed rate during this period will be 9.98 million tons per year.

#### Summary of Changes

- Section 1
  - Updated legal description
- Section 2
  - General Updates
    - Updated facility description
    - Added list of facilities in Table 1
    - Moved discharging facility and BADCT descriptions to Table 10
    - Updated financial capability summary
    - Updated references as necessary
  - Section 2.2.4
    - Updated based on current boilerplate language.
  - Section 2.3.5
    - Updated Elder Gulch Tailings Facility (C36) height restriction to 2,700ft AMSL
- Section 3
  - Updated CSI for financial assurance mechanism by setting the next due date to July 6, 2025, and added note regarding regular financial assurance mechanism updates
  - Updated CSI for closure and post-closure cost estimate by setting the next due date to July 6, 2029
  - Added CSIs for quarterly, semi-annual, and biennial compliance groundwater monitoring reports in section 2.7.1
- Section 4.0
  - Added Table 10 which contains discharging facility and BADCT descriptions
    - Updated 5-Series RDA (A5RDA) (Leach Facility) acreage in the facility description.
  - Updated acreage values in Table 11 based on LTF 90608
  - Revised the Individual BADCT for the Elder Gulch Tailings Facility in Table 10
  - Added additional monitoring requirements for the Elder Gulch Tailings Facility to Table 16
  - Updated Table 17 based on LTF 94195.
- Misc. changes
  - Changed “Groundwater Protection Value Stream” to “Groundwater Section”
  - Various formatting and cross-reference updates
  - Various grammatical corrections

#### **V. Best Available Demonstrated Control Technology (BADCT):**

The Ray Operations are divided into three sub-areas: A, B, and C. Sub-area B consists of the area underlain by the capture zone, characterized as the “passive containment” created by the Ray open pit. Sub-area A is the mine area located hydrologically upgradient of the passive containment, and

Sub-area C is the mine area located hydrologically downgradient of the passive containment. BADCT has been determined in accordance with the ADEQ Arizona Mining BADCT Guidance Manual.

The passive containment created by the Ray open pit has been deemed to satisfy the requirements of A.R.S. § 49-243(G). The passive containment created by the open pit is hydrologically isolated to the extent that it does not allow pollutant migration from within the capture zone. This passive containment is an integral part of the BADCT for all facilities located within Sub-area B, which is defined by the capture zone. Due to the isolated nature, within the Mineral Creek Basin, any groundwater flow originating from Sub-area A will flow into the capture zone of the passive containment created by the open pit, and the passive containment is therefore also an integral part of the BADCT for the facilities located within Sub-area A. BADCT evaluation of the existing facilities located in Sub-area C involved the following factors:

- Current discharge control technology (DCT) and site factors;
- Aquifer loading;
- Technically feasible alternative DCTs; and,
- Cost vs. discharge reduction.

BADCT is supplemented by a required inspection and maintenance program, and groundwater monitoring at the applicable points of compliance.

#### Elder Gulch Tailings Facility BADCT:

The TSF is constructed above a rockfill dam and is constructed, operated, and monitored as described and depicted in the October 25, 2010 AMEC Earth and Environmental “ASARCO LLC Ray Mine Complex, Elder Gulch TSF Expansion Final Report”, the January 10, 2011 AMEC Earth and Environmental “ASARCO LLC Ray Mine Complex, Elder Gulch TSF Expansion Operation, Maintenance, and Surveillance Manual”, and the current APP application documents submitted under LTF 94567.

A high capacity granular drain system placed in the main drainages beneath the rockfill dam and impoundment consists of ½” – 3” drain rock over sand and gravel filter over 100-mil HDPE liner. Underdrains in the dam embankment from the final upstream toe of the dam to the seepage collection pond shall be lined with textured 100-mil HDPE. Underdrains beyond the final upstream toe will not be lined.

#### **VI. Compliance with Aquifer Water Quality Standards (AWQS):**

Compliance with AWQS is required at the POCs listed in Table 3 Point of Compliance. The Facility shall monitor groundwater quarterly, semi-annually, annually, and biennially for the parameters listed in Tables 17, 18, and 19 respectively in the Individual APP.